

# **People, Activities, Contexts, Technologies**

A framework for designing  
interactive systems

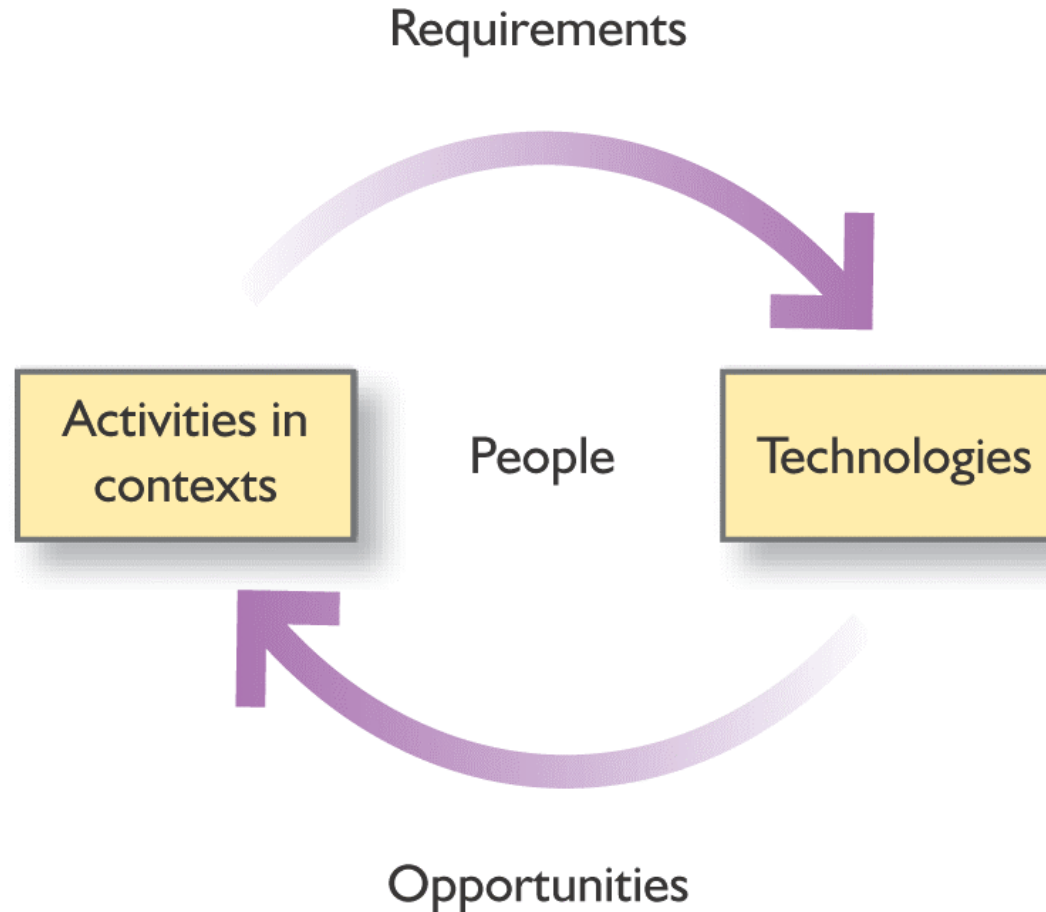
# PACT

*People undertake activities, in contexts using technologies.*

- A student uses a phone to send a text message whilst sitting on a bus
- Air traffic controllers work together using computers and flight strips to ensure smooth running of an airport in the air traffic control centre.
- A 70-year-old woman presses various buttons to set the intruder alarm in her house.

It is the variety in each of the PACT elements - and their combination - that makes interactive systems design so challenging and interesting.

# Activities and Technologies



Activities and technologies.

*Source: after Carroll (2002), Figure 3.1, p. 68.*

# Technologies change activities



Source: courtesy of Gavin Payne.



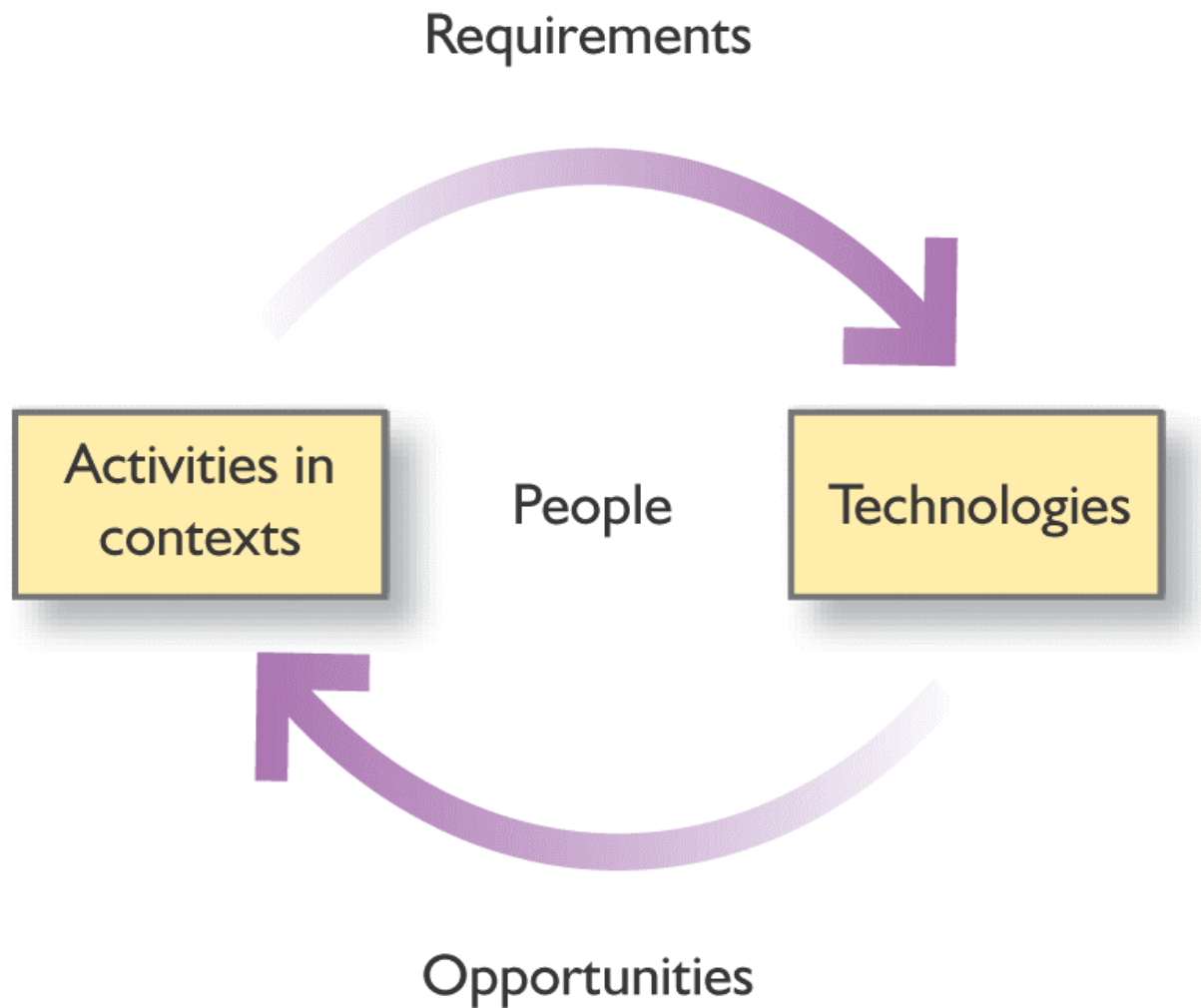
Source: Nokia 9500 Communicator. Courtesy of Nokia.



Source: courtesy of Motorola.

# Activities and technologies

- **Activities** (and the **contexts** in which they occur) establish **requirements** for technologies
- **Technologies** offer **opportunities** to undertake activities in different ways
- Designers try to design technologies within some domain (a 'sphere of activity') to meet **people's** requirements
- .... But in designing some technology (which may be hardware, or software, or both), they change people's activities.



**Figure 2.1** Activities and technologies.

*Source: after Carroll (2002), Figure 3.1, p. 68.*

## **Example: watching a film**

How has technology changed this activity?

... from the early days of cinema, to VCRs to  
DVDs....

## Some changes in film technology

- Silent films - people originally had a person explaining what was going on and a piano player for music
- Main stream cinema - popcorn, surround sound, huge screen, more immersive experience
- VCR - insert film and it plays! Simple, effective.
- DVD - more variety in selecting scenes, better quality (but sometimes jerky). More to do

# PACT

- People
- Activities
- Contexts
- Technologies

# People are different from one another

- Physical differences
  - Height, weight, different capabilities in sight, hearing, touch,...
- Psychological differences
  - Different ways of working; different memory abilities, spatial ability; different amounts of attention at different times; ability to recognize things or remember things. Different 'mental models'
- Usage differences
  - Experts versus novices, discretionary users of technologies, differences in designing for a heterogeneous group or a homogeneous group

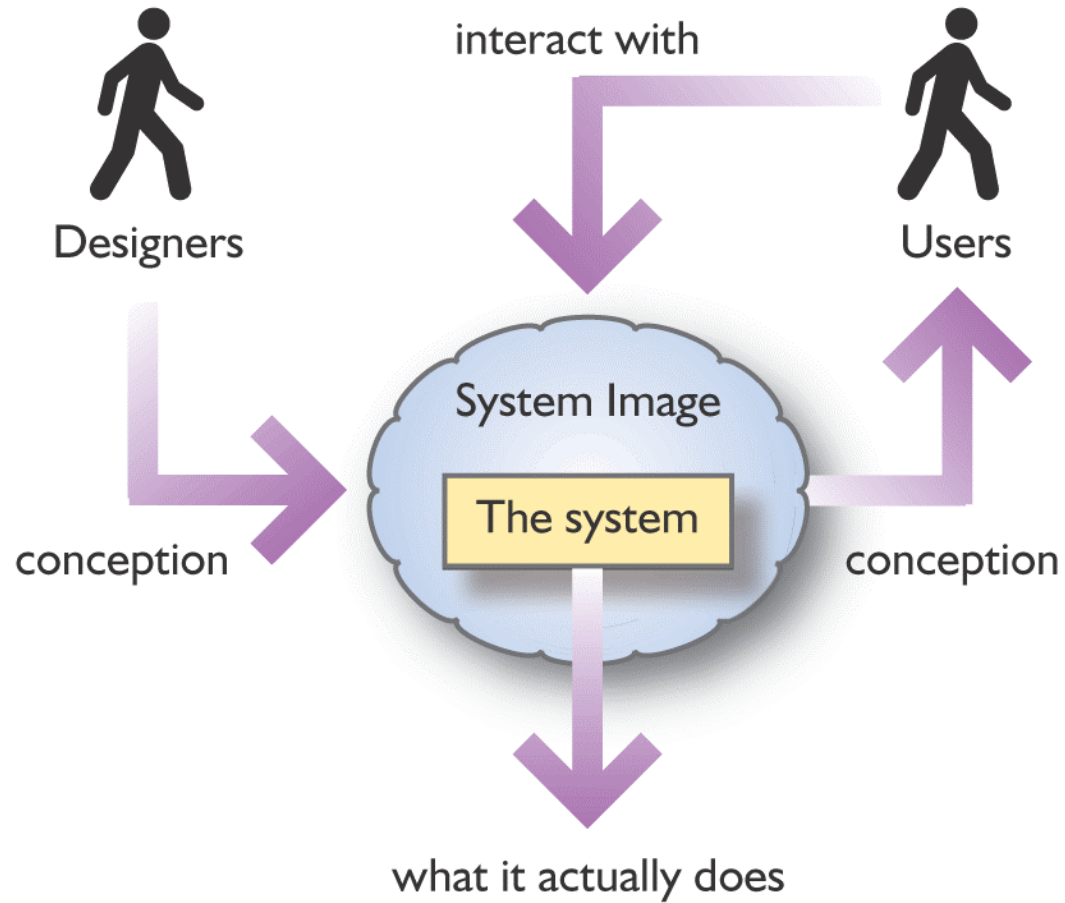
# **Psychological differences**

- Differences in perception and attention
- Differences in memory - short term and long term
- Differences in mental models of things

# Mental models

- Also known as conceptual models...
- ...mental models describe the ways in which we think about things - about how we conceptualize things.
- a key aspect of the design of technologies is to provide people with a clear model,
- ... so that they will develop a clear mental model
- ... but of course that depends on what they know already, their background, experiences, etc. etc.

# Creating a mental model



## Mental models

- Designers have a conceptual model.
- So does each user, based on interaction with the system.
- The system image results from the physical structure that has been built (including documentation, instructions and labels).
- The designer expects the user's model to be identical to his. However, the designer does not talk directly with the user.
- All communication takes place through the system image.
- If the system image does not make the designer's model clear and consistent then the user will end up with the wrong model.

## Mental models (continued)

- Fill in the details that people don't tell you
  - I took the tube yesterday... standard 'scripts'
- Are incomplete in that they don't include all the details
  - You could never know exactly what the designer knew
- Can be 'run' in that you use them in reasoning or remembering
  - e.g., how many windows are there in your house/flat?

# Characteristics of different activities

- Temporal aspects
  - To do with timing, frequency etc.
- Co-operation and Complexity
  - Working with others or not
- Safety critical
  - What problems happen if something goes wrong?
- Content
  - What information and media are we dealing with?

# Temporal aspects of activities affect designs

- How regular or infrequent are the activities?
  - E.g. making a call on a phone vs. changing the battery
  - Searching the Web versus working on an Excel spreadsheet
- Busy times versus quiet times
- Continuous set of actions, or can be interrupted?
  - Designing so that people can 'find their place' again after an interruption

# Temporal aspects of activities affect designs (continued)

- Response time from the system
  - 100 ms for hand-eye coordination activity
  - 1 second for cause-effect activity
  - Over 5 seconds and people quickly get frustrated

# More characteristics of activities

- Co-operative or not?
  - Is awareness of others and what they are doing important?
- Are they well-defined or vague?
  - Browsing versus doing something clear.
- Safety-critical issues
- Data requirements
  - Large amounts of alphabetic data - e.g. writing
  - Small amounts of static, unchanging data - e.g. swipe cards
- Media requirements
  - Need for video, text, colour, sound, etc.

# Different contexts of use

- Activities always take place in some context
- ‘Context’ sometimes means things that surround an activity and sometimes what glues an activity together
- Physical environment is one sort of context
  - ATM or ticket machine versus computer at home
- Social context is important
  - Help from others, acceptability of certain designs
- Organizational context
  - Power structure, changes in life style, de-skilling, etc.

# Different technologies

Hardware and software to consider

- Input
  - How to enter data and commands into the system. Suitability of medium for different contexts/activities
- Output
  - Characteristics of displays - 'streamy' media versus 'chunky' media. Characteristics of the content. Also feedback is important

## **Different technologies (continued)**

- Communication
  - Between person and technology. Bandwidth, speed. communication between devices
- Content
  - Functional systems versus systems more focused on content

## **Example: designing a ticket machine**

- South Kensington station is introducing a new system of automatic barriers and ticket machines. What are the characteristics of buying a ticket?
  - Regular/infrequent? Peaks and troughs; interruptible?  
Response time; co-operation? Vague/well-defined?  
Safety critical? Errors? Data requirements; media
- What mental model would you want to engender in people. How would you design for this?

# Ticket Machine

- Taking into consideration the contexts of use, the activities and the people. What technology will you design for the new ticket machines? Consider
- Input
- Output
- Communication
- Content

## **Ticket Machine ideas**

- Input - need to specify destination, need to provide payment, need to specify ticket type
  - Press button (depending how many stations). Have touch screen (gets greasy). Pay by mobile phone?
- Output - need to specify options, need to provide a ticket, need to say when complete.
  - Ticket could be electronic or paper. Printing facility needed. Options as buttons, or menu items? Need to provide change?

## **Ticket Machine ideas (continued)**

- Communication - must be simple. Could be Bluetooth. Probably button presses are easiest
- Content - need to specify stations, but it could have lots of local information. Help with travel planning?

# PACT Analysis

- Undertaking a PACT analysis is a useful starting point for design...
- Useful for both analysis and design
- Understanding the current situation
- Seeing where possible improvements can be made
- Envisioning future situations
- To do a PACT analysis, scope the variety of the Ps, As, Cs and Ts in the particular domain

# Doing a PACT analysis

- How to identify the range of PACT elements in a domain?
- Brainstorming
  - A group of you get together and talk through ideas and possibilities
  - Do not dismiss ideas at first - anything goes! Do not put other people's ideas down
  - After you have a set of possibilities go through and weed out the more ridiculous ones
- Envisioning ideas (making ideas visible)
  - Draw pictures, sketches, cartoons, cut out pictures from magazines and stick them on a board, etc.
- Work with relevant people
  - Workshops, interviews, observations
- Write up as scenarios

# Scenarios

- Scenarios are stories about people undertaking activities using technologies in contexts
- Develop conceptual scenarios that cover the main activities that the technology has to support
- Develop concrete versions of these for specific designs of the technology
- For example - a conceptual scenario might say 'Pete logs onto the computer'
- And a concrete version might be 'Pete clicks on the "log on" icon'

## Example conceptual scenario

- Bart Simpson has grown up a bit, and he has found out from his Dad that there are good jobs in Nuclear Safety at the plant, but he will need a qualification. He is going to study partly at home and partly at the plant.
- Homer has been asked to run this course, and decided to produce some of the training material. He goes to the Nuclear Safety Inspectorates web site and grabs a load of Learning Objects that seem to be about Nuclear safety. He rejects those that seem irrelevant to the jobs that Bart is likely to do initially.
- Its important that the NSI Learning Objects repository has enough information to select the appropriate Learning Objects, and that Homer (with years of experience in Nuclear Safety) has enough experience to select suitable Learning Objects.

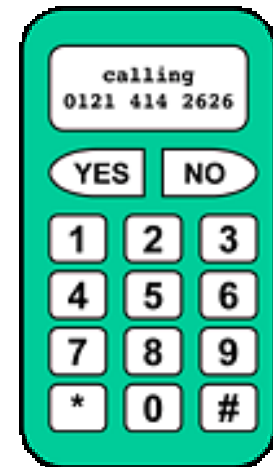
## Example conceptual scenario (continued)

- He also visits the supplier of Springfield's Nuclear Control Equipment's site, and finds some useful commercial Learning Objects. Will Mr Burns (owner of the Springfield Nuclear Power Plant) pay for them though? Some of the Learning Objects are about the internal wiring and other irrelevant stuff, they are rejected, others are about operation.
- There need to be links between them, Homer draws on his in depth knowledge of Nuclear Safety to link these together. He discovers from some Learning Objects that they require pre-requisite understanding of the nature of Plutonium, and he finds some Learning Objects at Springfield University...

## Example concrete scenario

Andy decides to ring a friend for whom he already has the number in his (paper) address book.

1. Andy looks up the phone number in his address book.
2. He dials the number into the phone.
3. The digits appear on the phone display.
3. He presses 'YES'.
4. The phone display says 'calling'.
5. A few seconds later it says 'connected'.
6. Andy talks to his friend.
7. When they finish talking Andy presses 'NO' to finish the call.



# Personas

- A Persona is a profile of an archetypical person in the domain
- Personas are synthesized from knowledge of real people in the domain
- Personas need to have goals - describe what they are trying to achieve
- Like scenarios, conceptual personas are abstract types - students, lecturers, etc.
- For design it is best to develop a few concrete personas who have hard characteristics such as age, interests, a name, etc.
- Try to bring the character alive - perhaps include a picture or two

# Example Persona

**Persona: Rhonda Wilson, Nurse Unit Coordinator**



Rhonda is a 36-year-old registered nurse who has worked at several skilled nursing facilities. She started out in acute care but moved to long-term care so she could have more autonomy. Rhonda was promoted to Unit Coordinator four years ago because she is very competent and generally well organised.

Rhonda is entirely overwhelmed and is drowning in paper, even more so than the average nurse. She often misses eating dinner with her boyfriend because she has to work late, filling out forms and reports.

## Example Persona (continued)

Rhonda's goals are to:

- Spend time on patient care and staff supervision, not paperwork.
- Be proactive. Rhonda needs to understand trends in order to solve problems before they happen, instead of just reacting to crises.
- Know that things are being done right. Rhonda supervises the unit because she's good at what she does. If nurses aren't following procedure or documenting things, she wants to know right away.

## Persona + Context setting

- Jan and Mike are a couple in their mid thirties. Mike is a university lecturer in Chemical Engineering and Jan is an manager at Barclays Bank.
- They live in the Hampstead area of London, in a two-bedroom flat overlooking the Heath. It is 12.00 noon on August 15<sup>th</sup>. Jan and Mike are sitting in their large, airy kitchen/dining room. The remains of pizza and mixed salad mingles with a pile of newspapers on the kitchen table.
- Jan and Mike have recently returned from a holiday on the island of Kefalonia and, apart from checking their e-mail, have not gone back to work. They decide that they would like to go to see one of the events that is happening as part of the London Film Festival.

## So that's PACT

- **People** demonstrate a wide range of knowledge, abilities and other characteristics. Their mental models of things are critical.
- **Activities** have different characteristics which affect how we design to support them.
- **Contexts** of use affect the suitability of different designs
- **Technologies** provide many opportunities for doing things differently.
- Activities and the contexts in which they happen set requirements for the technologies which in turn provide new opportunities
- Doing a PACT analysis is a good way of understanding a situation; scope the Ps, As, Cs and Ts looking at the variety of each.